

REMARKS

This Amendment, submitted in response to the Office Action dated October 7, 2003, is believed to be fully responsive to each point of rejection raised therein. Accordingly, favorable reconsideration on the merits is respectfully requested.

As a preliminary matter, the Examiner has objected to the abstract since the abstract should not exceed 150 words in length. Applicant has amended the Abstract as indicated above. It is believed that the Abstract is now in proper form.

As a further preliminary matter, Applicant has amended Fig. 12 to coincide with the specification.

Claims 1-26 are pending in the present application. Claims 1, 8 and 15-26 have been rejected under 35 U.S.C. 102(b) as being anticipated by Saber et al (Face Detection and Facial Feature Extraction Using Color, Shape and Symmetry-based Cost Functions; IEEE Proceedings on Pattern Recognition, ISBN: 1015-4651). Claims 2-7 and 9-14 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Saber. Applicant submits the following in traversal of the rejections.

Rejection of claims 1, 8 and 15-26 102(b) as being anticipated by Saber

The present invention describes a method and device for extracting an image subject by implementing a plurality of extracting algorithms. For example, in a first step of a representative embodiment, the circular shape of a face is extracted from an image. In a second step, skin color is detected from the circular shape. In another embodiment of the present invention, a face of an image is determined by weighting. Areas of an image are given votes or points according to

which areas of an image match the conditions of a face. The votes are then counted and the area containing the most votes is determined to be the face area.

Saber describes a method for detecting a face on an image and extracting the facial features of the face using color, shape and symmetry-based cost functions. A face is initially detected on an image based on a predetermined skin color. The skin color detection determines which areas pertain to the face of a person and which areas pertain to some other aspect of a person such as their clothing. Upon determining the face area, a symmetry-based cost function is used to determine the location of eyes on the face. The nose and mouth are then calculated based upon a predetermined distance from the eyes. See Fig. 1 and corresponding text.

Claim 1

The present invention, unlike the prior art, determines the shape of the face as a precedent stage. As indicated above, Saber detects skin color prior to detecting the shape of a face. Therefore, claim 1 should be deemed patentable.

Claim 8

With respect to claim 8, the Examiner states that arguments analogous to those presented for claim 1 are applicable to claim 8. However, claim 8 describes a device for extracting a specified image subject comprising a *change control unit* and an *image subject extraction processing unit* of a precedent stage, which is not described in claim 1.

Furthermore, any indication by the Examiner that the change control unit and the image subject extraction processing unit would be obvious in view of the prior art, would merely be a result of hindsight. In particular, Saber does not teach how its method of extracting a subject from an image is employed and the Examiner has not established otherwise.

Since the Examiner has not established that all of the elements of claim 8 are taught in the prior art, claim 8 should be deemed patentable.

Claim 15

The Examiner states that Saber discloses performing a vote in an N-dimensional space of an image characteristic quantity for *each extraction area* extracted by the specified image subject extracting algorithm or algorithms and performing weighting of degree of certainty as a specified image subject based on an aggregation value of the vote within a section area for aggregation in said N-dimensional space (claim 15). The Examiner cites figures 1-3, pages 656-657, section 2, sub-section 2.5, cost function 5 and cost function 10 in support of the rejection.

Fig. 1 and section 2 generally disclose a method of detecting a face, and an eye, nose and mouth localization algorithm. Fig. 2 discloses an ellipse which is used to detect a face region. Fig. 3, section 2.5, pages 656-657, and cost function 5 disclose the detection of eyes using symmetry-based cost functions and detection of a nose and mouth according to the location of the detected eyes. Cost function 10 demonstrates the weighted combination of the cost functions. See page 657.

First, Saber does not perform a *vote* in an N-dimensional space of an image characteristic quantity for each extraction area, as described in the present invention. Assuming the Examiner is maintaining that the symmetry-based cost functions teach the vote of the present invention, the cost function of Saber is a calculation of values on a face according to the distance of the eyes on a major and minor axis. The cost function of Saber is not a vote in an N-dimensional space of an image characteristic quantity as described in the present invention, as would be apparent to one of ordinary skill in the art.

Second, assuming the cost function of Saber teaches a vote, a cost function is applied only for the eyes (the nose and mouth are calculated based on a predetermined distance from the eyes) and not for *each* extraction area. Therefore, a vote is not performed for each extraction area.

Third, Saber does not teach an *aggregation of votes* within a section area. As previously indicated Saber performs a cost function which calculates the location of eyes on an image according to predetermined distances of a face on an axis. See section 2.5. The distance of eyes from an axis is not an *aggregation of votes* as described in claim 15.

For the above reasons, claim 15 should be deemed patentable.

Claim 16

The Examiner maintains that Saber teaches an image subject extraction processing in a subsequent stage is applied to an extraction area, as described in claim 16. The Examiner further states that Saber teaches that the aggregation value in the voting space of the image characteristic quantity exceeds a predetermined value, as further described in claim 16.

As previously indicated, Saber teaches the extraction of eyes from an image by using a cost function. The cost function calculates the location of the eyes on a major and minor axis. Therefore, Saber does not teach a voting space.

Furthermore, Saber does not teach that the *aggregation value in the voting space* of the image characteristic quantity exceeds a predetermined value. Threshold values t_1 and t_2 are used to determine whether the *distance* between the nose and mouth from the eyes is within a threshold distance. The threshold values are not used to calculate an *aggregation value in a*

voting space as would be apparent to one of ordinary skill in the art. Therefore, claim 16 should be deemed patentable.

Claim 17

The Examiner maintains that Saber teaches an extraction area corresponding to said section area for aggregation within a *preferential frame* in the *voting space* of said image characteristic quantity of claim 17, citing figures 1-5, pages 656-657, section 2, and sub-section 2.5 in support. As previously indicated, Saber does not teach a voting space and aggregation within a voting space. Furthermore, Saber does not teach a *preferential frame in a voting space* and the Examiner has not established otherwise. The burden is upon the Examiner and not the Applicant to particularly identify where aspects of the claimed invention are taught in the prior art. Since the Examiner has not established where Saber teaches a preferential frame in a voting space, claim 17 should be deemed patentable.

Claim 18

Claim 18 describes that a combination of a plurality of image characteristic quantities selected from the group consisting of a position, size, direction or orientation of an extraction area and, a posture, density or color tint of an image subject is used as the N-dimensional space of said image characteristic quantity.

The Examiner states that Saber teaches skin/non-skin classification and shape classification algorithms implementing a plurality of image characteristic quantities consisting of position, size, direction or orientation of an extraction area (Face, Eye, Nose and Mouth) and, a posture, density or color tint of an image subject (Skin-non-skin color classification in YES color

space). However, the Examiner did not indicate where Saber teaches an N-dimensional space of the image characteristic quantity. Therefore, claim 18 should be deemed patentable.

Claim 19

With respect to claim 19, the Examiner states Saber teaches that weighting value lowering processing is applied to a region within a predetermined area on a specific characteristic axis with respect to a neighborhood of the region, in which said aggregation value became large, in said N-dimensional characteristic stage, citing figures 1-5, pages 656-657, section 2, and sub-sections 2.4-2.5. The Examiner states that the principal axes of the elliptical skin classified region in N-dimensional eigenspace and eyes are located on a line which is parallel to the minor axis represented by the direction of the eigenvector corresponding to the smaller eigen values.

Applicant submits that the Examiner has not established where Saber teaches *weighting value lowering processing* is applied to a region within a predetermined area on a specific characteristic axis. At most, Saber teaches weighting of cost functions (cost function 10) and does not teach a weighting value lowering processing of claim 19. Therefore, claim 19 should be deemed patentable.

Claim 20

Claim 20 requires “weighting value lowering processing” to remove a remarkably large size or a remarkably small size from extraction data. The Examiner takes “Official Notice” of this feature. To this end, the Examiner states that it is a conventional methodology in statistical decision processing to remove a remarkably large size or a remarkably small size from extraction

data to increase the accuracy and reliability of extracting the subjects for recognition or classification purposes.

Applicant submits that when an Examiner takes Official Notice concrete evidence must be in the record to support these findings. MPEP 2144.03. The Examiner's personal reasoning in view of the present invention is not concrete evidence. Furthermore, since Applicant is traversing the Examiner's assertion of Official Notice, the Examiner must provide documentary evidence in the next Office Action if the rejection is to be maintained. *Id.*

Claims 21-26

The Examiner maintains that the arguments analagous to those presented for claims 15-20 are applicable to claims 21-26. Claims 15-20 should be deemed patentable for the reasons set forth above, therefore, claims 21-26 should also be deemed patentable. Furthermore, claims 21-26 describe for example, an image subject processing unit and a weighted processing unit which is not described in method claims 15-20. Since the Examiner has not established that all of the elements of claims 21-26 are taught in the prior art, claims 21-26 should be deemed patentable.

Rejection of claims 2-7 and 9-14 under 103(a) as being unpatentable over Saber

Claims 2 and 9

The Examiner maintains that the arguments analogous to those presented for claim 1 are applicable to claims 2 and 9. However, the Examiner concedes that Saber does not explicitly disclose the plurality of specified image subject extracting algorithms in each stage of a plurality of stages by means of parallel processing and takes Official Notice that parallel processing is an extremely well known procedure in image processing.

Assuming parallel processing is well known in *image processing*, the Examiner has not provided concrete evidence that parallel processing is well known for implementing *extracting algorithms*. The Examiner's argument that the addition of parallel processing in extracting algorithms is obvious is merely a result of impermissible hindsight upon viewing the present invention. In particular, the reference cited by the Examiner describes extraction of an image by classifying a skin area of an image, after classifying a skin area fitting an ellipse in the skin region and then symmetry-based cost functions are applied to locate the eyes, tip of nose and center of mouth. See subsection 2 and Fig. 1. Therefore, Saber does not perform parallel processing.

Furthermore, since Applicant is traversing the Examiner's assertion of Official Notice, the Examiner must provide documentary evidence in the next Office Action if the rejection is to be maintained. MPEP 2144.03.

Also, the Examiner applied the same arguments with respect to claims 2 and 9 as that applied to claim 1. However, claims 2 and 9 describes extraction parallel processing units and a control unit which is not described in claim 2. Since the Examiner has not established that all of the elements of claim 9 are taught in the prior art, claim 9 and dependent claims 3-7 should be deemed patentable.

Claims 6 and 7

Claim 6 describes that the plurality of specified image subject extracting algorithms to be implemented by means of *parallel processing* in each stage are of the *same combination* in the plurality of stages. Claim 7 describes that the plurality of specified image subject extracting

algorithms to be implemented by means of *parallel processing* in said each stage are of a *different combination* in the plurality of stages.

The Examiner maintains that arguments analagous to those presented for claim 2 are applicable to claims 6 and 7. However, with respect to claim 2, the Examiner merely took Official Notice that parallel processing is well known in image processing. The Examiner did not establish that parallel processing is well known for extracting images, let alone that it is well known to implement the same or different combinations of algorithms in each stage of a parallel processing. Therefore, claims 6 and 7 should be deemed patentable.

Claims 10-14

The Examiner maintains that arguments analagous to those presented for claims 3-7 are applicable to claims 10-14. However, claims 3-7 should be deemed patentable for the reasons set forth above, therefore, claims 10-14 should also be deemed patentable. Furthermore, claims 10-14 describe for example, an image subject extraction parallel processing unit and a control unit which is not described in method claims 3-7. Since the Examiner has not established that all of the elements of claims 10-14 are taught in the prior art, claims 10-14 should be deemed patentable.

Applicant has added claims 27-40 to provide a more varied scope of protection.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. APPLN. NO.: 09/630,315

ATTORNEY DOCKET NO. Q58744

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

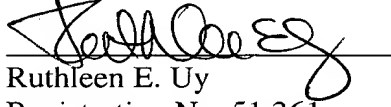
Respectfully submitted,

SUGHRUE MION, PLLC
Telephone: (202) 293-7060
Facsimile: (202) 293-7860

WASHINGTON OFFICE

23373

CUSTOMER NUMBER


Ruthleen E. Uy
Registration No. 51,361

Date: January 7, 2004